WORK PLAN

ADDITIONAL DNAPL RECOVERY WELLS / DNAPL RECOVERY TRENCH CONCEPTUAL DESIGN

DETREX RD/RA SOURCE CONTROL AREA
DETREX FACILITY
ASHTABULA, OH
DOCKET NO. V-W-98-C-450

Prepared for
Detrex Corporation
Ashtabula, OH

May 2011

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Project No. 13814323

URS

May 20, 2011

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Subject: Submittal of Additional DNAPL Recovery Wells /
DNAPL Recovery Trench Conceptual Design Work Plan
Detrex Source Control Area – Fields Brook Superfund Site
Detrex Corporation, Ashtabula, Ohio
Docket No. V-W-98-C-450

Dear Mr. Thompson:

On behalf of Detrex Corporation (Detrex), and in response to the letter dated March 28, 2011 from USEPA regarding the installation and operation of additional DNAPL recovery wells, URS Corporation (URS) prepared a Work Plan for *Additional DNAPL Recovery Wells / DNAPL Recovery Trench Conceptual Design* for your review and approval. Following receipt of the March 28, 2011 USEPA, Detrex contacted USEPA and requested an extension for submittal until May 23, 2011. USEPA approved this request.

For your convenience, URS is submitting the *Additional DNAPL Recovery Wells / DNAPL Recovery Trench Conceptual Design Work Plan* to USEPA via email followed by three (3) hard copies via Federal Express for your review. If you have any questions regarding this submittal, please do not hesitate to contact me at 216-622-2432 at your convenience.

Sincerely,

URS Corporation - Ohio

Martin L. Schmidt, Ph.D.
Vice President

Enclosure

cc: R. Currie – Detrex Corporation
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This Work Plan has been prepared in response to the March 28, 2011 letter from the United States Environmental Protection Agency (USEPA) concerning the installation and operation of additional dense non-aqueous phase liquid (DNAPL) recovery wells at the Detrex Corporation (Detrex) Facility (Site) located in Ashtabula, Ohio (see **Appendix A**). This letter cited the RD/RA Source Control Area Interim Operations, Maintenance and Monitoring Manual (OM&M) that was submitted to USEPA in June 2008. As described in the OM&M Plan, Detrex proposed to install enhanced fluid recovery wells and presented a revised approach for DNAPL recovery. Additionally, USEPA provided Detrex with a requested response to the handling of on-site DNAPL impacted soils with respect to the proposed installation of a DNAPL recovery trench in the former pond area (i.e., DNAPL source area) of the Site. Following receipt of this letter, Detrex contacted USEPA and indicated that it would be preparing the Work Plan, documented herein, in order to meet the request of the USEPA to respond to the March 28, 2011 USEPA letter and requested an extension for submittal until May 23, 2011. USEPA has approved this request.

This Work Plan describes procedures for installing a series of additional DNAPL recovery wells, a DNAPL recovery trench, and the associated on-site management of soils generated during the installation of these systems. In addition, this Work Plan will provide information related to Operations, Maintenance & Maintenance, Health and Safety, and Performance Monitoring that will be required in order to accommodate the installation and operation of the enhanced DNAPL Recovery System at the Site. The existing Interim OM&M Plan will not be completely revised but will include new sections to describe modifications to the existing DNAPL Recovery System, including the new recovery wells and trench. The revised OM&M Plan will be submitted upon completion of the recovery well and trench installations. Detrex will also update the existing site-specific Health & Safety Plan (HASP) to reflect the fieldwork outlined as part of the proposed Scope of Work. Finally, Detrex will prepare a Performance Monitoring Plan to include the new DNAPL recovery wells and recovery trench, in order to develop remedial action performance criteria for continued DNAPL recovery.

1.1 HISTORY & BACKGROUND

Detrex Corporation (Detrex) operates a facility at 1100 North State Road in Ashtabula, Ohio. **Figure 1-1** depicts the general location of the Detrex Facility. On February 26, 1998, the United States Environmental Protection Agency (USEPA) issued a Unilateral Administrative Order (UAO) and a Scope of Work for Remedial Design and Remedial Action for the Detrex Source Area (the UAO SOW) requiring that Detrex develop plans and specifications for remedial measures at the facility.

Phase I Remedial Investigation/Feasibility Study (RI/FS) Source Control environmental assessment investigations identified an area in the northeast corner of the Detrex Facility where soil and groundwater have been impacted by chlorinated volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). Soil borings and monitoring wells in this area have also identified a DNAPL layer that contains these VOCs and SVOCs. The area was formerly occupied by a series of settling ponds that were taken out service and backfilled with

soil. The former ponds were associated with manufacturing operations that have been discontinued at this facility.

Technical Memorandum 3 (W-C, May 1997) included a feasibility study that identified several conceptual remedial alternatives for the Detrex site. The USEPA selected Alternative No. IV in the Source Control Record of Decision (ROD) issued September 1, 1997, to address the environmental conditions identified at the facility and prevent recontamination of sediment within Fields Brook. Alternative IV included:

- A downgradient vertical barrier wall (slurry wall);
- A groundwater collection trench upgradient of the slurry wall;
- A groundwater collection trench beneath the DS Tributary;
- Removal of sediments from the northern drainage ditch;
- Re-grading activities in the northeastern portion of the property;
- Removal of the catalyst pile materials; and
- Installation of a DNAPL recovery system.

Each of the action items, with the exception of the DNAPL recovery system, was addressed in the Plans and Specifications for Remedial Design/Remedial Action dated February 17, 2000. A Remedial Action Work Plan for those activities was issued on August 28, 2000 and work was initiated in September 2000. The slurry wall, collection trenches sediment excavation, site grading and catalyst pile removal were completed in March 2001.

The Plans and Specifications for DNAPL Recovery System were issued at the 100 percent level on April 13, 2001. As agreed with USEPA, 12 of the 36 proposed recovery wells were installed in order to evaluate the DNAPL recovery system design as a pilot study prior to full-scale implementation. Construction of the pilot DNAPL recovery system was completed in October 2002. Since October 2002, modifications to the DNAPL recovery system, which have been completed and documented in quarterly reports, submitted to USEPA.

Based on the data collected to-date, Detrex is proposing further enhancements to the existing DNAPL Recovery System. The proposed enhancements focus on the northern perimeter of the former pond area with the installation of additional DNAPL recovery wells, as well as along the southern and eastern perimeters with the installation of a DNAPL recovery trench. Further details are presented in the remainder of the Work Plan, documented herein.

1.2 OBJECTIVES

The objective of the additional DNAPL recovery wells and trench is to provide for enhanced collection of DNAPL associated with the former pond area of the Site, in order protect Fields Brook and its tributaries from potential recontamination. Detrex considers that the addition of a series of DNAPL recovery wells and the DNAPL recovery trench will effectively surround the former pond area (i.e., DNAPL source area) and allow for the recovery of any potentially mobile

DNAPL in the subsurface. Because the existing DNAPL recovery system is labor intensive and DNAPL recovery volumes have historically decreased, the system enhancements are designed to minimize or eliminate the operation and maintenance issues associated with the existing DNAPL recovery system such as deterioration of piping, well screen malfunctions, and HSSE issues related to contact with DNAPL. In order to meet this objective, the Work Plan provides the following information:

- Overview of existing DNAPL recovery system and associated maintenance issues;
- Description of the additional DNAPL recovery well design;
- Description of the DNAPL recovery trench design;
- Locations of additional DNAPL recovery wells and trench;
- Soils Management Plan for DNAPL impacted soils which may be encountered during field activities;
- Schedule for implementation; and
- HASP considerations.

1.3 WORK PLAN OUTLINE

The Work Plan, documented herein, is broken down into the following sections:

- **Section 1.0** – Introduction
- **Section 2.0** – DNAPL Recovery System Overview
- **Section 3.0** – Additional DNAPL Recovery Scope of Work
- **Section 4.0** – Operation & Maintenance / Performance Monitoring
- **Section 5.0** – Health & Safety Program
- **Section 6.0** – Schedule and Cost Estimate

This section provides an overview of the existing DNAPL recovery system, including O&M issues, as well as an overview of the proposed enhancements to the DNAPL recovery system. Details are provided in the following sections.

2.1 OVERVIEW OF EXISTING DNAPL RECOVERY SYSTEMS

The existing (pilot) DNAPL recovery system consists of a performance-scale, vacuum-enhanced DNAPL recovery system installed to remove readily recoverable DNAPL from the subsurface. Twelve (12) recovery wells (RW-1 through RW-12) were originally installed as a part of the DNAPL recovery pilot study. **Figure 2-1** depicts the location of the existing DNAPL recovery system. Additional enhancement to the DNAPL recovery system was completed in 2007 with the installation of two (2) DNAPL recovery wells (RW-13 and RW-14). To-date, the DNAPL recovery system has recovered an estimated 16,000 gallons of DNAPL from the subsurface since operations began in 2002. Since the original system was designed as a pilot system, it has been the intention of Detrex to enhance and optimize the operation of the system based on observed conditions at the Site. Concurrently, Detrex has also installed a number of other remedial measures at the Site (i.e., eastern slurry wall, eastern groundwater collection trench, and southern groundwater interceptor trench) to mitigate the potential impacts of DNAPL from the former pond (i.e., source) area.

The original DNAPL recovery system was designed to operate continuously, although not all components of the system may have operated at a given time, based on site conditions. Key design considerations included the density of the DNAPL (specific gravity-1.5), the low permeability of the subsurface materials, and the incompatibility of the DNAPL constituents with certain common construction materials, such as poly vinyl chloride (PVC).

Previously completed work activities associated with the DNAPL Recovery System include the following:

- DNAPL Recovery Well Drilling and Installation - Completion of 12, stainless steel, Phase I DNAPL recovery well installations along the northern border of Detrex property and running north-south from the northern boundary of Detrex property (see **Figure 2-1**).
- DNAPL System Monitoring Wells - Completion of three (3), stainless steel, Phase I DNAPL monitoring wells in the vicinity of the recovery wells for monitoring of groundwater levels and DNAPL thickness. Following the initial monitoring well installations, four (4) supplementary new monitoring wells were installed proximal to the DNAPL recovery wells to monitor DNAPL recovery.
- Equipment Building Installation - Installation of the equipment building, including but not limited to the foundation and floor slab, all specified plumbing, pumping stations, valves and manifolds, blowers, filters, DNAPL/water separator, DNAPL holding tank, and granular activated carbon treatment vessels.
- Satellite Pump House Installation - Installation of two (2) satellite pump houses, including but not limited to, all specified plumbing, pumps, valves, and manifolds.

- Plumbing and Hardware Connections - Installation of piping, braces and supports to connect the system together as described in previously submitted documentation, addenda, or written and approved changes or modifications.
- Power Supply - Installation of a power supply adequate to operate and maintain all components of the system.
- Logic Controllers – Installation of programmable logic controllers for the operation of the DNAPL Recovery System components.
- Additional DNAPL Recovery Wells – Completion of two (2) stainless steel recovery wells installed using sonic drilling techniques with a larger borehole size and modified screen slot sizes. In addition, different DNAPL extraction pumps were installed.

2.2 OVERVIEW OF OPERATION AND MAINTENANCE ISSUES

Since installation of the pilot DNAPL recovery system was completed in October 2002, a significant quantity of DNAPL has been recovered. However, not all system components have historically functioned as anticipated, resulting in a high level of maintenance. Between October 2002 and September 2003, four wells were capped and taken off-line due to short-circuiting of injected air (RW-2 and RW-11) or excessive sediment production (RW-4 and RW-10). Silting within the original DNAPL recovery wells has been problematic since the startup of the system.

During Fall 2003 and Winter 2004, Detrex made several improvements to the treatment system, including the following:

- Installation of an approximately 500-gallon vertical stainless steel settling tank with a rounded base to receive the system influent in the treatment building. The existing DNAPL/water separator was removed;
- Replacement of the existing pump houses with 8'x 8' x 8' wood-framed buildings with heating, insulation, lighting and ventilation. The existing recovery pumps and vacuum boxes were re-used, and the manifolds were rebuilt and equipped with pneumatically actuated solenoid valves;
- Replacement of existing HDPE piping (tubing) with stainless steel piping due to sagging between supports and concerns that low spots may freeze. Detrex also replaced the HDPE drop tubes with stainless steel drop tubes;
- Redevelopment and sediment removal from all existing DNAPL recovery wells;
- Installation of sleeves in two existing wells to assess the effectiveness of reducing available screen length in reducing short-circuiting;

Although the screens and casing of all recovery wells remain intact, select wells remain off-line due to short-circuiting or excessive silt production or DNAPL crystallization, despite the system improvements. In addition, it is anticipated that the wells will likely require increased pressure over time to pump DNAPL, which will further exacerbate problems with short-circuiting. Based

on a review of operational data as well as the ongoing maintenance issues with silt production, Detrex installed two (2) additional DNAPL recovery wells in 2007 to attempt to address the previously observed problems associated with DNAPL recovery at the Site. The following changes to the existing well design and recovery system were as follows:

- To reduce or eliminate excess silt build-up including DNAPL crystals in the well, the borehole diameter was increased to approximately 12-inches, and the screen size was decreased from 0.020 to 0.010 inches. In addition, the grain size of the well sand pack was reduced to allow less than 5% of the sand pack to pass through the screen.
- To avoid short-circuiting, the pumping system design was modified to eliminate the introduction of air into the recovery well screen.

The alternative recovery well design was implemented with the install of DNAPL recovery wells RW-13 and RW-14. Following installation, the DNAPL recovery wells were placed into operation. However, the re-designed DNAPL recovery wells continued to exhibit low DNAPL recovery rates. As a result, Detrex has again re-evaluated the DNAPL Recovery System and is proposing further enhancements to the system designed to address noted operational issues and low DNAPL recovery in wells. The proposed enhancements to the existing DNAPL Recovery System are presented briefly in Section 2.3, and further details are provided in Section 3.0.

2.3 PROPOSED ADDITIONAL DNAPL RECOVERY SYSTEM COMPONENTS

Based on a request by USEPA in March 2011, Detrex has re-evaluated the historical operation of the existing DNAPL Recovery System and is proposing to further enhance DNAPL recovery with the installation of additional DNAPL recovery wells and the installation of a DNAPL recovery trench. As indicated previously the enhancements will be focus on the perimeter of the former pond area (i.e., DNAPL source area) with a combination of additional vertical recovery wells and a recovery trench. A brief overview of each of the proposed enhancement components is presented in the following sections.

2.3.1 Proposed Additional DNAPL Recovery Wells

Additional vertical DNAPL recovery wells are proposed along the northern property boundary of the Site in order to enhance the recovery of DNAPL in this area. Eighteen (18) recovery wells will be installed on approximately 30 to 40 foot centers. The locations of the proposed recovery wells are based on historical information, including results from the Sediment and DNAPL Delineation Report (URS, 2010). The tentative locations of the supplemental DNAPL recovery wells are depicted graphically in **Figure 2-2**.

The supplemental DNAPL recovery wells will be installed from ground surface through the lacustrine clay into the top of the underlying glacial till. The wells will be screened over the bottom five (5) feet of the lacustrine clay with a five (5) foot sump extending into the glacial till. Total well depths are anticipated to range from 30 to 35 feet below ground surface (ft-bgs). Stainless steel material will be used for both the well casing and screen. A cross section along

the northern property boundary of the Site depicting the anticipated depths of the proposed supplemental DNAPL recovery wells is shown in **Figure 2-3**.

2.3.2 Proposed Additional DNAPL Trench

A DNAPL recovery trench is proposed extending along the southern and eastern perimeter of the former pond area. The recovery trench will be installed using a continuous trencher capable of simultaneously excavating the trench, laying the collection pipe, and backfilling the excavation. The location of the proposed recovery trench is also based on historical information, including results from the Sediment and DNAPL Delineation Report (URS, 2010). The tentative location of the DNAPL recovery trench is depicted graphically in **Figure 2-4**.

The supplemental DNAPL recovery trench will also be installed from ground surface through the lacustrine clay extending to the top of the underlying glacial till. The recovery trench will be backfilled with granular material from the base of the excavation to approximately five (5) ft-bgs. The remaining open excavation will then be backfilled with compacted clay. The recovery trench will drain to a single sump that will be located at the west end of the trench proximal to the existing DNAPL recovery system and associated piping. The sump will be installed into the underlying glacial till to provide a low point for the removal of any accumulated DNAPL. The total trench depth is anticipated to range from 28 to 30 ft-bgs. A cross section along the proposed alignment of the recovery trench is depicted in **Figure 2-5**.

This section provides additional details related to the proposed Scope of Work (SOW) related to the installation of supplemental DNAPL recovery wells and a DNAPL recovery trench near the former pond area (i.e., DNAPL source area) at the Site. Additionally, details are provided related to the management of DNAPL-impacted soils, operations & maintenance modifications, and development of a project completion report.

3.1 ADDITIONAL DNAPL RECOVERY WELLS

The following section present details related to the design and installation of the supplemental DNAPL recovery wells that are part of this SOW.

3.1.1 DNAPL Extraction Well System Design

The intent of the supplemental DNAPL recovery well design is to:

1) Provide additional locations where potentially mobile DNAPL can be removed from the subsurface;

2) Limit O&M issues related to silt and crystallized DNAPL entering the wells;

3) Provide a line of recovery along the northern property boundary of the Site; and

4) Work in conjunction with the existing DNAPL recovery system.

Eighteen (18) new DNAPL recovery wells will be installed using extraction wells will be installed in 12-inch diameter boreholes. The boreholes will be advanced using Rotosonic drilling techniques. Rotosonic drilling uses a combination of rotary motion and oscillation. During this process, the drill bit is vibrated up and down while also being pushed down and rotated. This creates a high frequency force that in overburden causes the soil particles to fluidize. Spoils are moved using water or compressed air. The primary advantage of the rotosonic technique is reduction of smearing of the subsurface as the borehole is completed and the reduction in the volume of spoils created.

At a minimum, the borings will extend to the contact between the lacustrine clay and glacial till soils, which are expected to be encountered at approximately 25 ft-bgs based on existing recovery wells. The actual depth will be determined in the field based on conditions encountered. Boring logs will be prepared for each location and will include the following information:

- A description of geologic materials and the depth at which encountered;
- Static water level;
- Boring termination depth;
- A description of problems and corrective measures;
- The depth and diameter of the temporary casing; and
- Well construction details.

Well casing materials will be 3.0-inch diameter, type 304 flush threaded stainless steel pipe. Well screens will be 3.0-inch diameter continuous wrapped stainless steel with 0.010-inch slots. Screen length will be approximately 5 feet. The actual screen length will be determined based on field conditions and may be adjusted during well installation based on the boring logs. The filter pack will consist of poorly graded fine (USCS) sand with less than 5 percent passing a #8 standard sieve opening. The filter pack will extend approximately 2-4 feet above the top of the screen. Proposed well construction details are presented in **Figure 3-1**.

3.1.2 Proposed Extraction Well Locations

In order to further enhanced the recovery of potentially mobile DNAPL the new recovery wells are proposed for installation in the general vicinity of the northern property boundary of the Site (see **Figure 2-2**). Based on historical data, DNAPL has been noted in borings completed in these areas. The exact locations will be determined based on field conditions and the presence of above or below ground piping, lines, etc… The overall intent of the supplemental DNAPL recovery wells is to provide additional DNAPL recovery locations along the northern property boundary in conjunction with the existing DNAPL Recovery System. Additionally, the locations of the supplemental recovery wells will be surveyed for horizontal and vertical control.

3.1.3 Decontamination and Disposal Equipment and Soil Cuttings

All drilling equipment including any rotosonic equipment, split-spoons or other tools that are exposed to subsurface materials will be decontaminated with a high-pressure steam-cleaning unit followed by three rinses. All decontamination water will be collected in a portable decontamination unit and the liquid will be disposed of through the existing DNAPL Recovery and Treatment System.

Soils generated as part of the recovery well installations will be combined with the soils from the recovery trench and managed on-site within the former pond area as part of the DNAPL Soils Management Plan (see Section 3.3).

3.1.4 Recovery Well Development

Following installation of the new recovery wells, they will be developed by the drilling contractor and Detrex personnel by surging and by removing up to 10 well volumes of liquid. During development the liquid will visually inspected for turbidity. All purge water will be disposed of through the existing DNAPL Recovery and Treatment System.

All soil cuttings removed from the boreholes will be stockpiled within the footprint of the former pond area and temporarily with plastic sheeting. Following the completion of the recovery well and recovery trench installations the soils will be left in-place within the former pond and permanently covered following the methods outlined in the DNAPL Soils Management Plan (see Section 3.3. URS, URS' drilling subcontractor, and Detrex personnel will work in concert to coordinate the temporary storage and placement of the soil cuttings from the recovery well installations.

3.1.5 Connection to Existing DNAPL Recovery System

Upon completion of drilling and well installation, the new recovery wells will be fitted with stainless steel drop tubes to facilitate the individual collection of accumulated DNAPL within the wells. No dedicated pumps are being proposed for the new recovery wells, instead Detrex personnel will monitor DNAPL accumulation and removal will occur when recoverable DNAPL has accumulated in the well. The monitoring and removal of DNAPL from the new recovery wells will be further detailed in the revised OM&M Plan.

3.2 DNAPL RECOVERY TRENCH

The following section present details related to the design and installation of the additional DNAPL recovery trench that is part of this SOW.

3.2.1 DNAPL Recovery Trench Design

The intent of the DNAPL recovery trench is to alternative extraction well design is to provide for the additional recovery of potentially mobile DNAPL from the subsurface along a continuous line situated along the southern and eastern boundaries of the former pond area, and to work in conjunction with the existing DNAPL recovery system.

Detrex is proposing to install the approximately 600 foot long DNAPL recovery trench using a continuous trencher capable of excavating an 18-inch wide trench to depth of approximately 25 ft-bgs. The continuous trenching equipment also has the ability to simultaneously install the collection pipe and backfill material. The trench will be sloped from east (high point) to west (low point) to promote the flow of any mobile DNAPL to a collection sump installed at the western terminus of the trench. The DNAPL recovery trench sump will be excavated approximately 3 feet below the invert of the collection trench (i.e., approximately 28 ft-bgs) to allow for the collection and removal of mobile DNAPL. The use of the continuous trenching equipment will also minimize the volume of spoils created.

The depth of the recovery trench is designed to extend from ground surface to the contact between the lacustrine sediments and glacial till soils, which are expected to be encountered at 25 - 30 ft-bgs, based on existing recovery wells. The actual trench depth will be determined based on a series of planned alignment boring which will be completed prior to finalizing the design of the recovery trench. Additional details related to the proposed alignment borings are presented in Section 3.2.2.

The recovery trench collection pipe will be constructed of 4 to 6-inch high-density polyethylene (HDPE) screen and pipe. The recovery trench backfill material will be appropriately sized granular material (i.e., stone) and will extend from the base of the excavation to within approximately 3 feet of ground surface; the remaining excavation will be backfilled with site soils and compacted in order to minimize the infiltration of surface drainage to the trench. The design of the recovery trench sump is not final, but at a minimum will be constructed of a 14-inch diameter HDPE pipe that will be set approximately 3 feet below the invert of the collection piping.

3.2.2 Proposed Recovery Trench Location

In order to further, enhance the recovery of potentially mobile DNAPL the recovery trench is proposed for installation in the general vicinity of the southern and eastern limits of the former pond area (see **Figure 2-4**). Based on historical data DNAPL has been noted in borings and monitoring wells completed in these areas. The final alignment of the recovery trench will be determined based on alignment borings completed prior to the final design. The overall intent of the DNAPL recovery trench is to isolate the downgradient portion of the former pond area and provide for the collection of any potentially mobile DNAPL. Additionally, the location of the recovery trench and sump will be surveyed for horizontal and vertical control.

In order to evaluate the total depth of the recovery trench a series of alignment borings are planned prior to finalizing the design. Detrex is proposing to complete up to eight (8) alignment borings, identified as RTA-1 through RTA-8, as depicted in **Figure 3-2**. Further, Detrex is proposing to complete the borings using a direct push rig equipped with a membrane interface probe (MIP) to provide data on both contaminant impacts and soil type. The borings will be completed from ground surface to the glacial till and are anticipated to be in the range of 20 to 30 ft-bgs.

3.2.3 Decontamination and Disposal Equipment and Soil Cuttings

All drilling equipment including any rotosonic equipment, split-spoons or other tools that are exposed to subsurface materials will be decontaminated with a high-pressure steam-cleaning unit followed by three rinses. All decontamination water will be collected in a portable decontamination unit and the liquid will be disposed of through the existing DNAPL Recovery and Treatment System.

Soils generated as part of the recovery trench installation will be managed on-site within the former pond area as part of the DNAPL Soils Management Plan (see Section 3.3).

3.2.4 Recovery Trench Operation

Following installation of the recovery trench, Detrex personnel will monitor the sump for the presence and/or accumulation of DNAPL. Any DNAPL collecting in the sump will be periodically removed, based on the rate of accumulation, and managed by Detrex personnel through the existing DNAPL Recovery and Treatment System.

3.2.5 Proposed Connection to Existing System

Upon completion of the new recovery trench, the sump will be fitted with stainless steel drop tube to facilitate the collection of accumulated DNAPL. No dedicated pumps or equipment is being proposed for the recovery trench sump; instead, Detrex personnel will monitor DNAPL accumulation and remove DNAPL as necessary. The monitoring and removal of DNAPL from the new recovery wells will be further detailed in the revised OM&M Plan.

3.3 DNAPL AREA SOILS MANAGEMENT

As described in the USEPA letter dated March 28, 2011, the agency has determined that excavated soils from activities related to Source Control remediation efforts may remain on-site within the impacted area (i.e., former pond area). USEPA provided several provisions to Detrex if impacted soils are generated during field activities. These provisions included the following:

- There needs to be an affirmative determination that the material is remediation waste.
- The waste material must be kept within the area of contamination.
- The waste material must be controlled so as to pose no risk of migration.

Upon receipt of the March 28, 2011 letter, Detrex notified USEPA that a design for a DNAPL Recovery Trench would be included as part of this Work Plan.

In order to comply with the requirements specified by the USEPA for on-site soil management, Detrex will prepare an area within the footprint of the former pond area for use subsequent use as a soils management area. **Figure 3-3** provides the approximate location of the proposed area within the former pond boundaries. The area proposed for soils management has been previously backfilled with soil following the closure of the former ponds in the mid-1970s. The area is currently mounded and sloped radially. An approximate 125 ft x 125 ft area will be designated as the DNAPL Soils Management Area. The area will be excavated to a depth of approximately 1.5 ft-bgs and the surficial soils will be utilized to create a soil berm surrounding the excavation in order to isolate the materials generated from the recovery well and recovery trench installation activities. All generated soils will then be placed within the limits of the berm. Materials placed within the berm will be minimally compacted and graded.

Upon completion of the field installation activities and placement of the generated soils, the DNAPL Soils Management area will be covered with a 40-mil geomembrane and geotextile fabric in order to limit surface water coming into contact with the soils. The geomembrane and geotextile will then be covered with a layer of approximately 6 inches of #57 stone in order to cover the liner and further stabilize the material. A schematic cross section of the conceptual design is presented as **Figure 3-4**.

3.4 OPERATION & MAINTENANCE ADDENDUM

Upon completion of the supplemental recovery wells and recovery trench, Detrex will initially monitor the wells and trench for potentially mobile DNAPL in order to determine the quantities and rates of any DNAPL accumulation. This initial monitoring will be reported to the USEPA in a brief Technical Memorandum to be submitted within 45 days of the systems being placed into operation.

Once initial data evaluation is completed, Detrex will prepare an Addendum to the existing Operation, Maintenance and Monitoring (OM&M) Plan, which will document the ongoing evaluation and operations of the supplemental DNAPL recovery wells and trench. Submittal of the OM&M Plan Addendum to the USEPA will be within 90 days of the system being placed into operation.

3.5 PROJECT COMPLETION REPORT

Within 90 days of the completion of all fieldwork, Detrex will prepare and submit to the USEPA a Project Completion Report. This report will contain, but not be limited to the following items:

- Introduction
- Methodologies
- Deviations from the Work Plan
- Data Summary (including, boring logs, survey information, etc…)
- As-built Drawings
- Discussion of Field Observations
- Summary and Conclusions

Only a final version of the Project Completion Report is anticipated for documentation purposes. Ongoing documentation related to the operation of the supplemental recovery wells and recovery trench will be presented along with reporting for the existing DNAPL Recovery System.

The existing DNAPL Recovery System is operated according to the existing Interim OM&M Plan. The addition of the supplemental DNAPL recovery wells and DNAPL recovery trench will necessitate modifications and revisions to the existing OM&M Plan. Additionally, the new recovery wells and trench will also require evaluation, on an ongoing basis, to evaluate the effectiveness of DNAPL recovery in the former pond area of the Site.

This section briefly outlines the proposed O&M and a Performance-Monitoring Program that will be implemented once the new systems become operational.

4.1 SUPPLEMENTAL DNAPL RECOVERY WELLS

The design of the supplemental DNAPL recovery wells is to facilitate the recovery of DNAPL from the wells in a manual operation mode. As DNAPL potentially accumulates in the wells, Detrex personnel will remove the free product on an as-needed basis using a mobile collection system consisting of surface-mounted pumps and storage totes. Any recovered DNAPL will be quantified volumetrically and added to the existing DNAPL Recovery and Treatment System for subsequent handling / processing by Detrex.

Evaluation of the DNAPL recovery wells will take place in phases. The following section briefly outlines the various anticipated phases.

4.1.1 Initial DNAPL Recovery Well Testing

Following the installation and development of the supplemental DNAPL recovery wells, DNAPL recovery testing will be completed to evaluate the potential for DNAPL to accumulate in the individual recovery wells. The general procedure is outlined below:

1) Allow water level to stabilize along with DNAPL level (if present);

2) Once levels have stabilized, take baseline levels and evacuate DNAPL from recovery well;

3) Monitor recovery of DNAPL over time in well until recovery approaches original levels;

4) Develop DNAPL recovery curves for each of the wells; and

5) DNAPL recovery intervals will then be based on the observed rates and a schedule for removing free product at each location can be developed.

Once developed the schedule should be periodically re-evaluated based on observed DNAPL recovery and adjusted accordingly. The general procedure outlined above should be utilized as part of each re-evaluation.

4.1.2 DNAPL Recovery Well Performance Monitoring

Each of the 3-inch recovery wells will be equipped with a dedicated stainless steel drop tube (i.e., nominal 1-inch diameter) to facilitate to recovery of product from the well. Recovered

DNAPL volumes should tracked over time to provide information pertinent to evaluating overall DNAPL recovery. The following data gathering efforts are recommended as part of ongoing performance monitoring:

- Bi-weekly DNAPL and water level gauging in each recovery well;
- Bi-weekly DNAPL and water level gauging in existing monitoring wells located proximal to any of the supplemental DNAPL recovery wells;
- Determination of recovered DNAPL volumes from each recovery well at each removal event;
- Graphing of DNAPL recovery per event and cumulative DNAPL recovery from each recovery well;
- Periodic re-evaluation of DNAPL removal schedule (see Section 4.1.1); and
- Periodic gauging of total well depths to evaluate siltation within the wells, as well as recovery well re-development as warranted.

The bi-weekly monitoring events will likely be adjusted to monthly or quarterly based on the ongoing evaluation of the DNAPL recovery data.

4.2 DNAPL RECOVERY TRENCH

The design of the supplemental DNAPL recovery trench, like the recovery wells, is to facilitate the recovery of DNAPL from the recovery trench sump in a manual operation mode. As DNAPL potentially accumulates in the sump, Detrex personnel will remove the free product on an as-needed basis. Any recovered DNAPL will be quantified volumetrically and added to the existing DNAPL Recovery and Treatment System for subsequent handling / processing by Detrex.

As was the case for the DNAPL recovery wells, the evaluation of the DNAPL recovery trench will also take place in phases. The following section briefly outlines the various anticipated phases using a mobile collection system consisting of surface-mounted pumps and storage totes.

4.2.1 Initial DNAPL Trench Recovery Testing

Following the installation of the supplemental DNAPL recovery trench, DNAPL recovery testing similar to that approach used for the recovery wells will be initiated to evaluate the potential for DNAPL to accumulate in the trench. The general procedure is outlined below:

1) Allow water level to stabilize along with DNAPL level (if present)

2) Once levels have stabilized, take baseline levels and evacuate DNAPL from recovery trench sump

3) Monitor recovery of DNAPL over time in well until recovery approaches original levels

4) Develop DNAPL recovery curve for the trench

5) DNAPL recovery intervals will then be based on the observed rate and a schedule for removing free product from the trench can also be developed

Once developed the schedule should be periodically re-evaluated based on observed DNAPL recovery and adjusted accordingly. The general procedure outlined above should also be utilized as part of each re-evaluation.

4.2.2 DNAPL Recovery Trench Performance Monitoring

The DNAPL recovery trench sump will also be equipped with a dedicated stainless steel drop tube (i.e., nominal 2-inch diameter) to facilitate to recovery of product from the sump. Recovered DNAPL volumes should tracked over time to provide information pertinent to evaluating overall DNAPL recovery. The following data gathering efforts are recommended as part of ongoing performance monitoring:

- Bi-weekly DNAPL and water level gauging in the recovery trench sump;
- Bi-weekly DNAPL and water level gauging in existing monitoring wells located proximal to the alignment of the DNAPL recovery trench;
- Determination of recovered DNAPL volumes from the recovery trench sump at each removal event;
- Graphing of DNAPL recovery per event and cumulative DNAPL recovery from the recovery trench sump;
- Periodic re-evaluation of DNAPL removal schedule (see Section 4.1.1); and
- Periodic evaluation of the sump total depth to evaluate siltation within the trench and sump, as well as recovery trench flushing / re-development as warranted.

The bi-weekly monitoring events will likely be adjusted to monthly or quarterly based on the ongoing evaluation of the DNAPL recovery data.

A site specific Health and Safety Plan (HASP) has been prepared for drilling and sampling at the Detrex Site. An Addendum to the existing HASP will be prepared, as necessary and used for the completion of the trench alignment borings, installation of the supplemental DNAPL recovery wells, and installation of the DNAPL recovery trench. During the completion of the fieldwork, it is anticipated that upgrades to Level B may be required. Prior to initiating the fieldwork, specific safety procedures for using Level B equipment will be reviewed by all personnel.

Detrex will provide a copy of the revised HASP to the USEPA prior to the initiation of the field activities outlined in this Scope of Work.

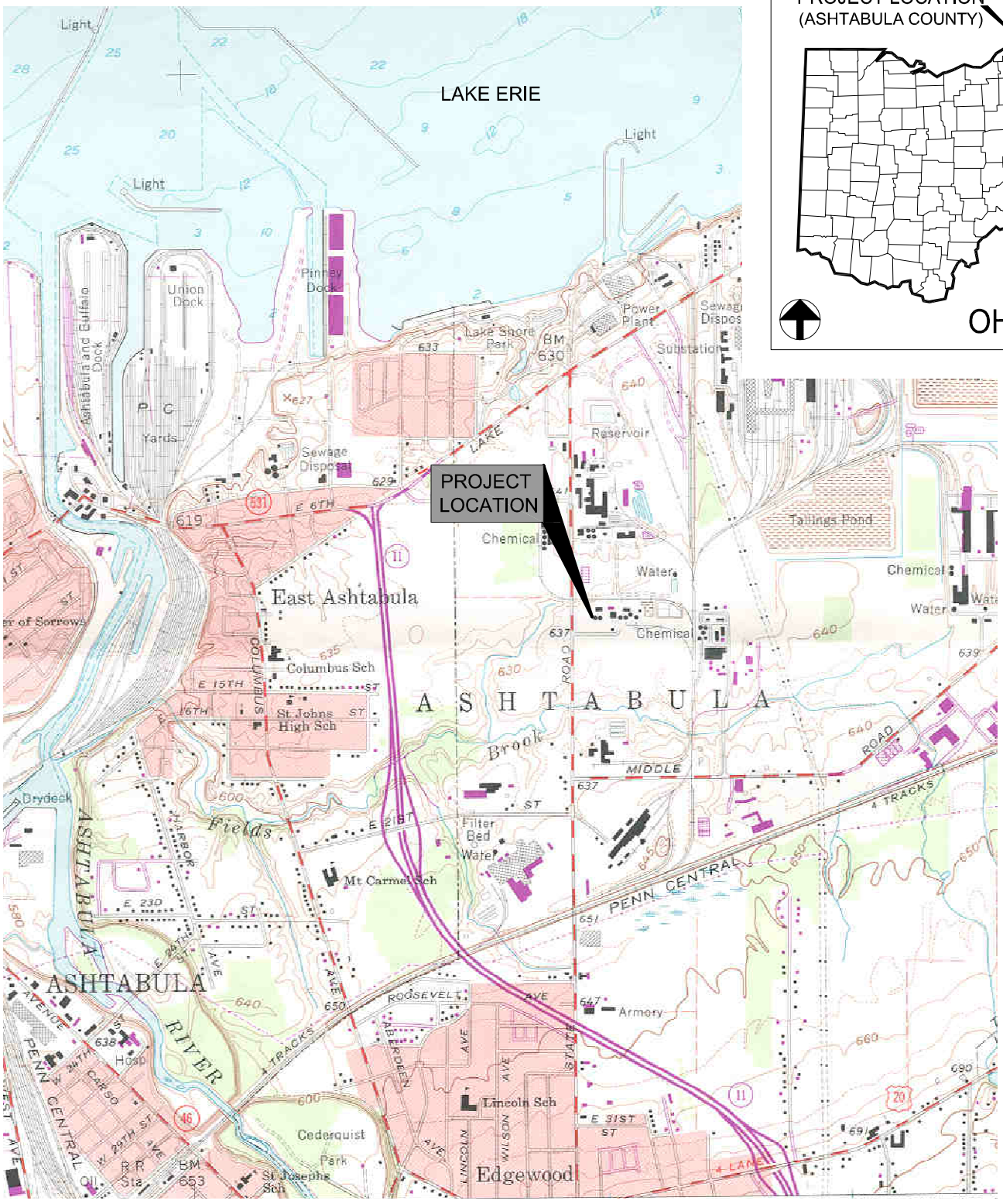
This section provides details related to the proposed schedule for completing the items outline in Section 3.0 (Scope of Work). Detrex is prepared to initiate the Scope of Work, documented herein, upon USEPA approval to proceed. Field activities will commence as soon as possible (weather permitting) of notice to proceed depending on subcontractor availability.

6.1 PROPOSED SCHEDULE

The following provides a general overall project schedule:

- **Work Plan Submittal** – May 23, 2011
- **Work Plan Approval / USEPA Notice to Proceed** – June 23, 2011
- **Alignment Borings and Final Recovery Trench Design** – July 2011
- **Supplemental DNAPL Recovery Wells** – August – September 2011
- **DNAPL Recovery Trench** – September - October 2011
- **Updated Operation, Maintenance and Monitoring (OM&M) Plan** – December 2012
  Upon completion of the fieldwork, the existing OM&M Plan will be updated. The update will potentially involve addition of several sections to the existing OM&M Plan. The additions will include:
  - Description of modifications to existing system;
  - Description of supplemental recovery well and recovery trench operations; and
  - Description of any prescribed performance monitoring.
- **Project Completion Report** – February 2012

FIGURES



UNITED STATES GEOLOGICAL SURVEY
1:24,000 QUADRANGLE
ASHTABULA NORTH, OHIO
1960 PHOTO REVISED 1970
PHOTOINSPECTED 1978

0 1000 2000
SCALE: 1"=2000'

URS

DETREX CORPORATION
ASHTABULA, OHIO

PROJECT SITE LOCATION MAP

DRAWN BY:	CHECKED BY:	PROJECT No:	DATE:	FIGURE No:
YRC	MLS	13810732	1/18/10	1

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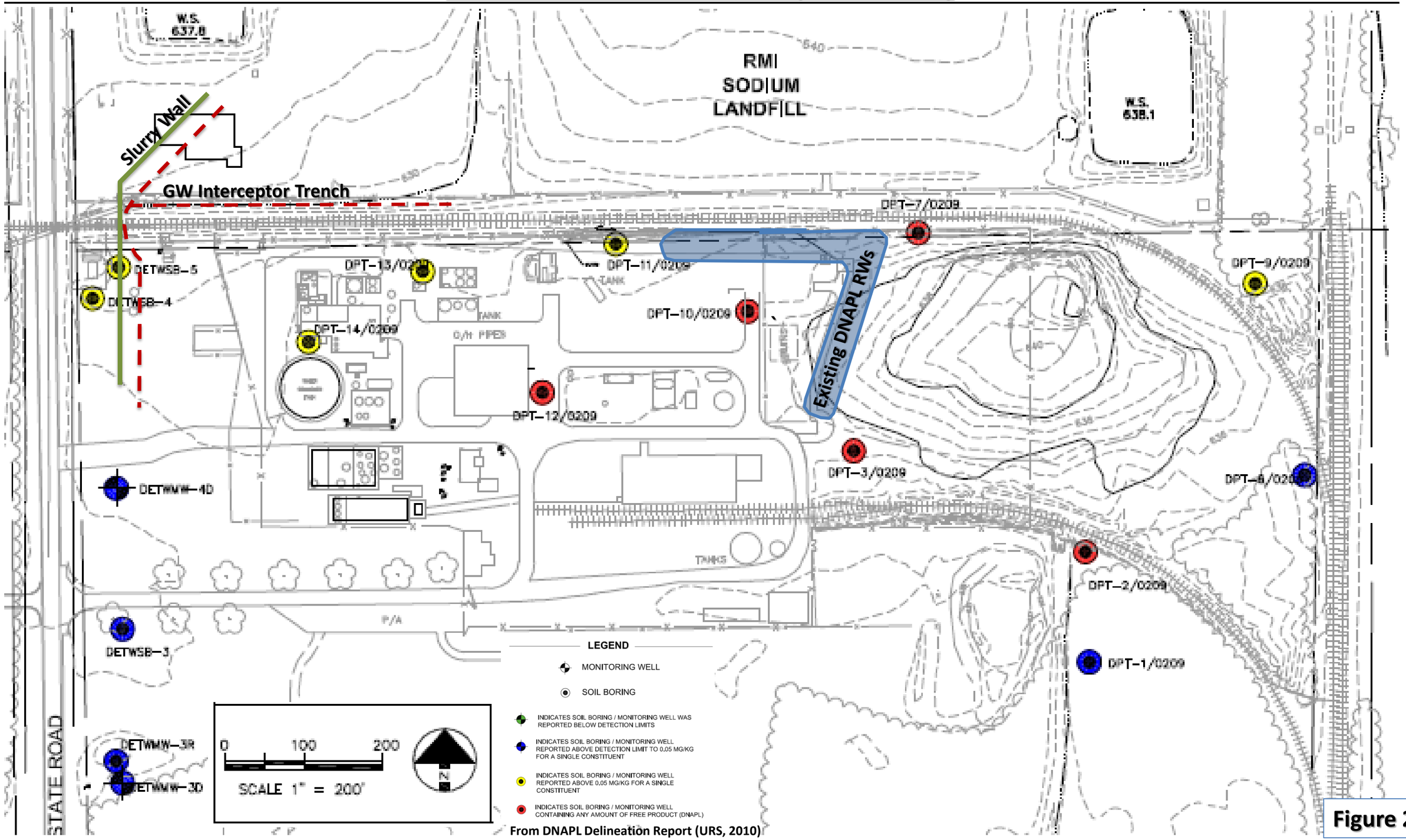
Existing DNAPL Recovery System – Location

Detrex Site – Ashtabula, OH (Aerial View)

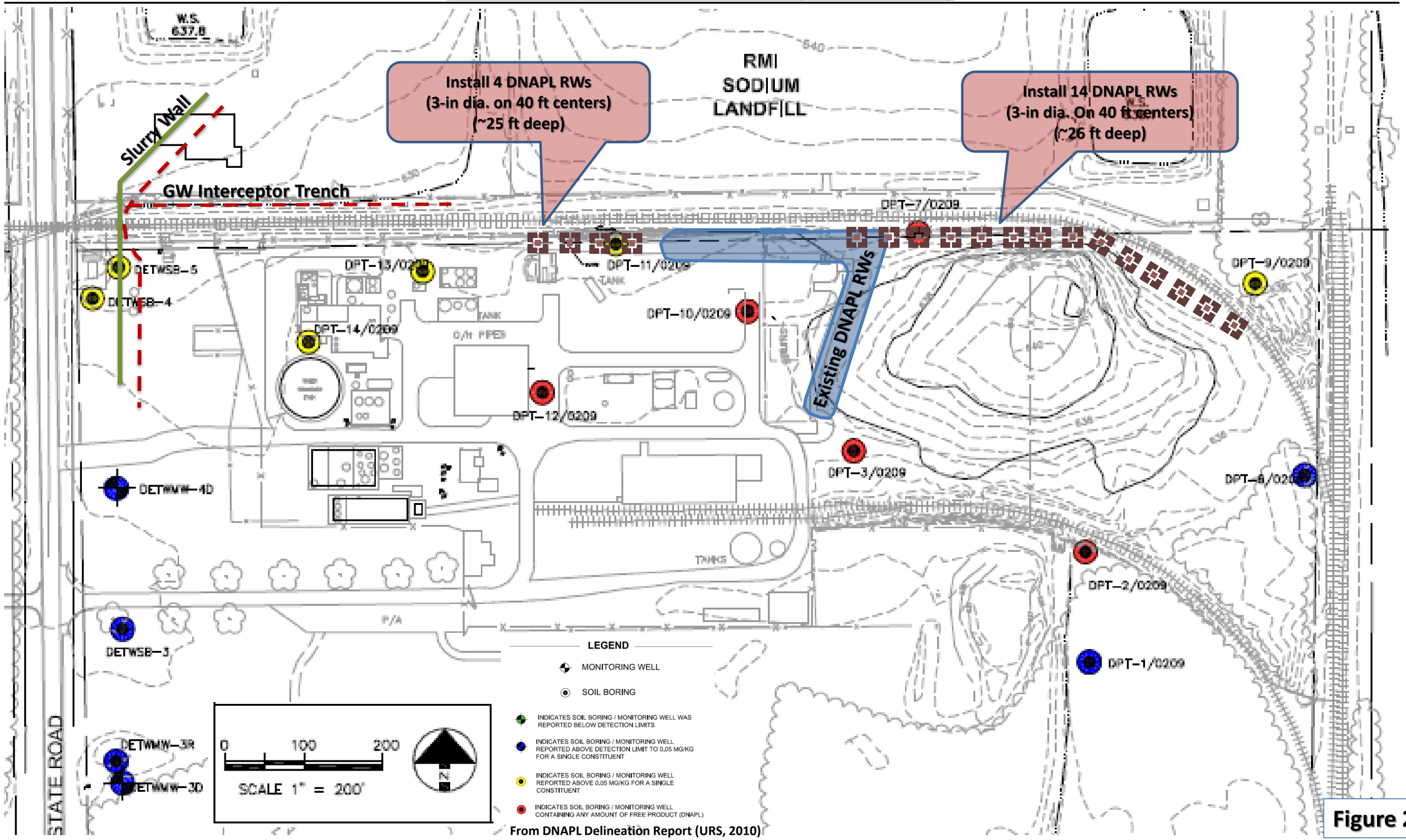


From DNAPL Delineation Report (URS, 2010)

Figure 2-1

Conceptual Design – Additional DNAPL Recovery Wells Schematic

Detrex Site – Ashtabula, OH (Aerial View)



From DNAPL Delineation Report (URS, 2010)

Figure 2-2

Conceptual Design – Additional DNAPL Recovery Wells X-Section

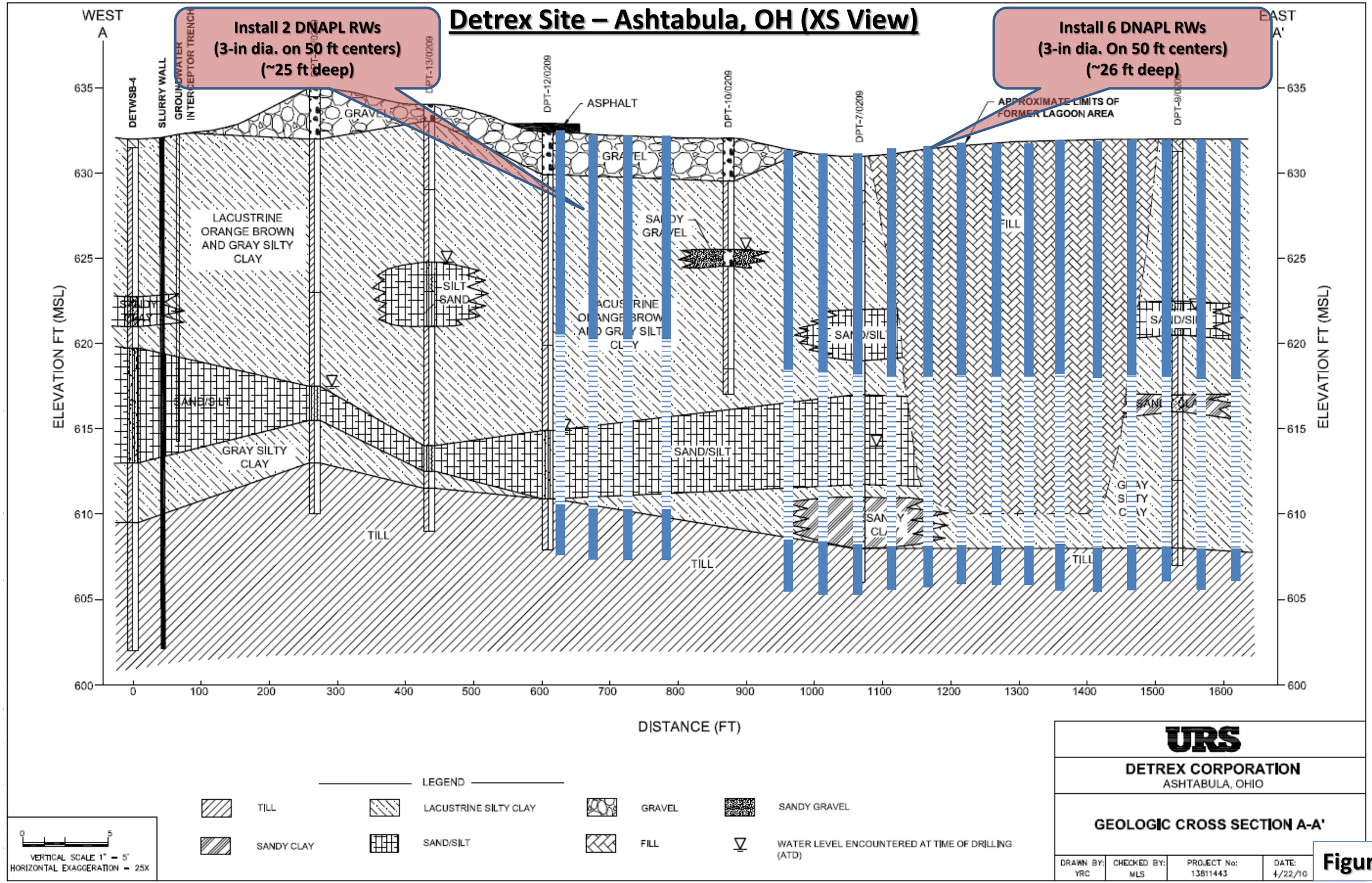
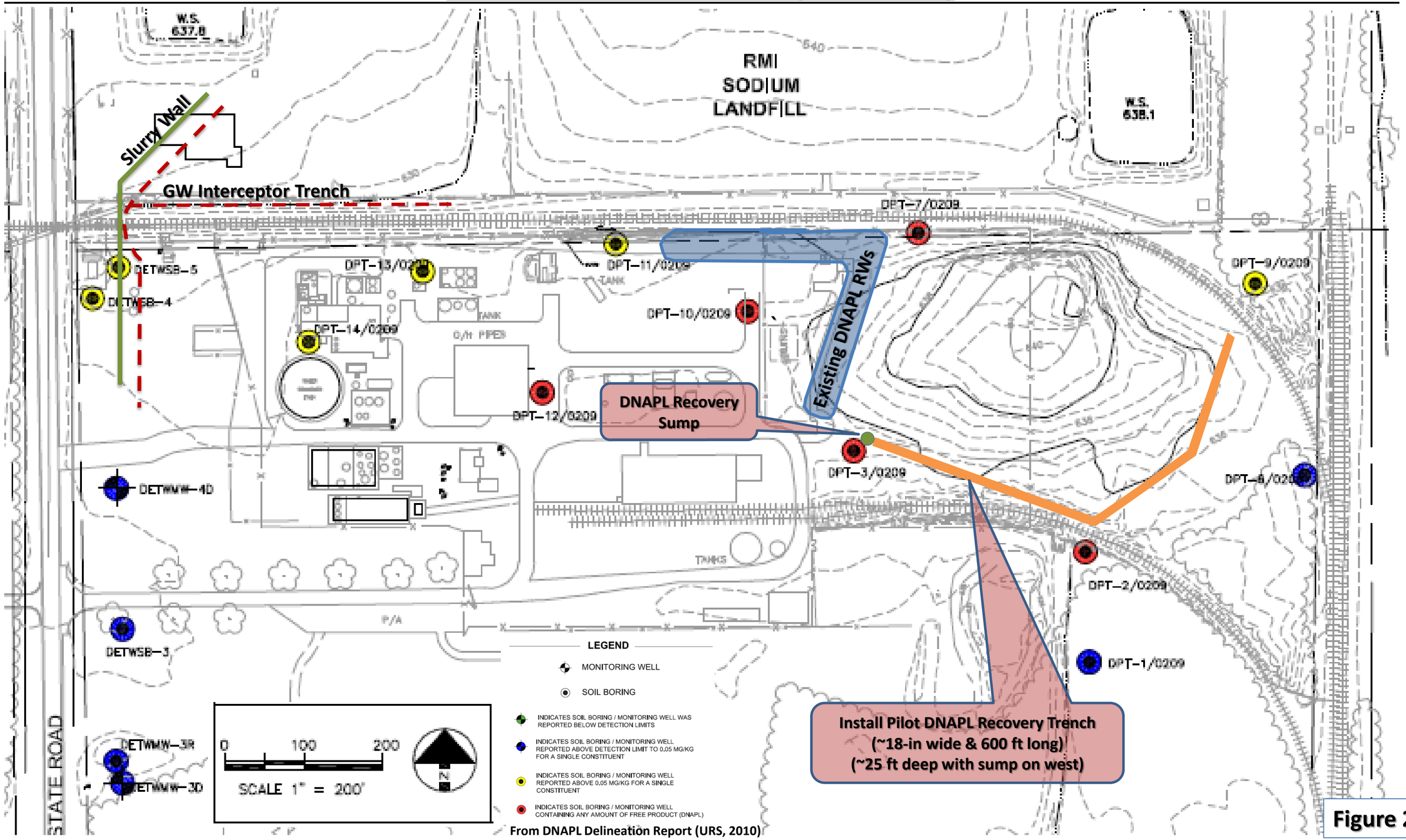


Figure 2-3

Conceptual Design – Additional DNAPL Recovery Trench Schematic

Detrex Site – Ashtabula, OH (Aerial View)



From DNAPL Delineation Report (URS, 2010)

Figure 2-4

Conceptual Design – Additional DNAPL Recovery Trench X-Section

Detrex Site – Ashtabula, OH (XS View)

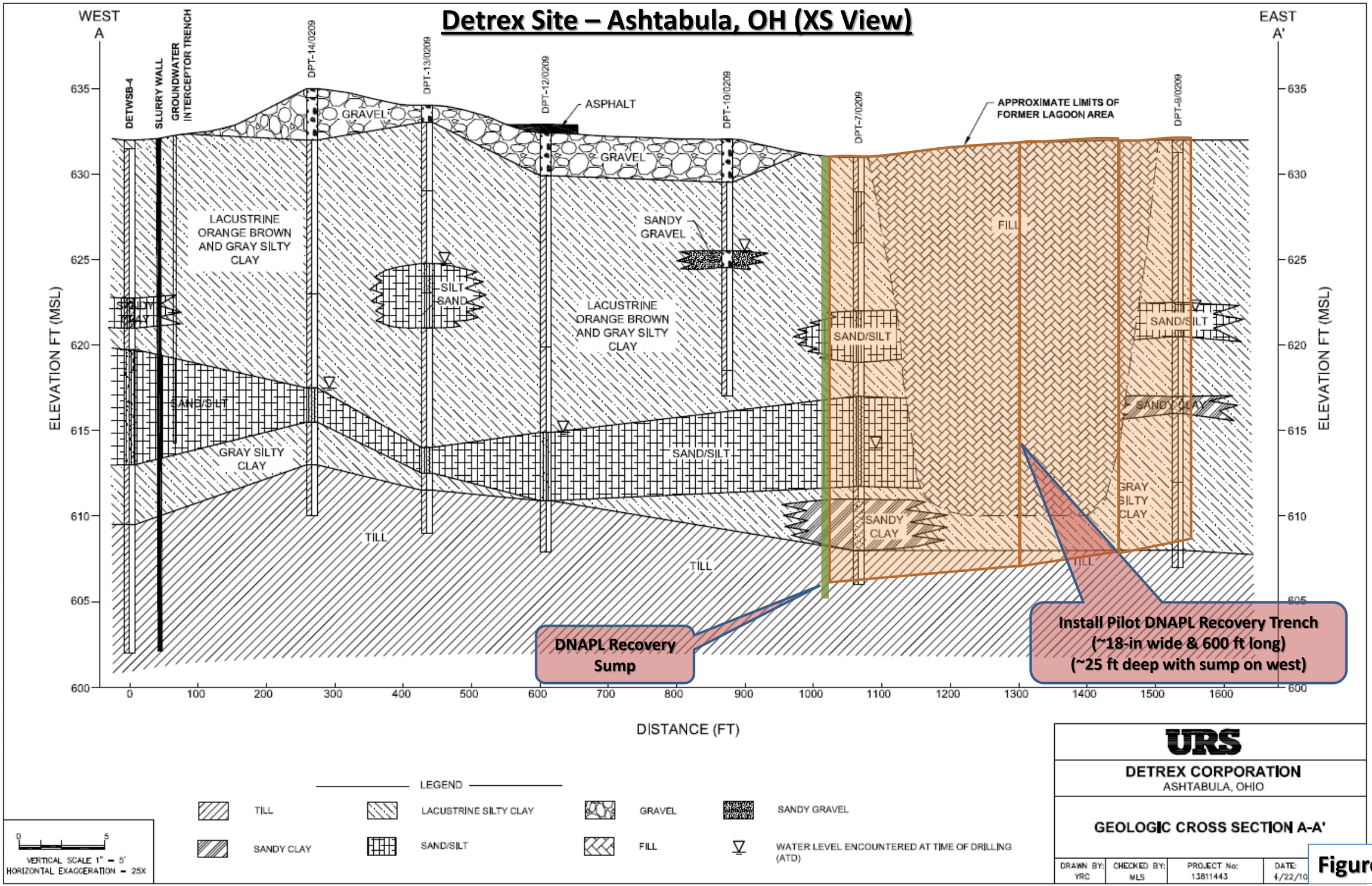
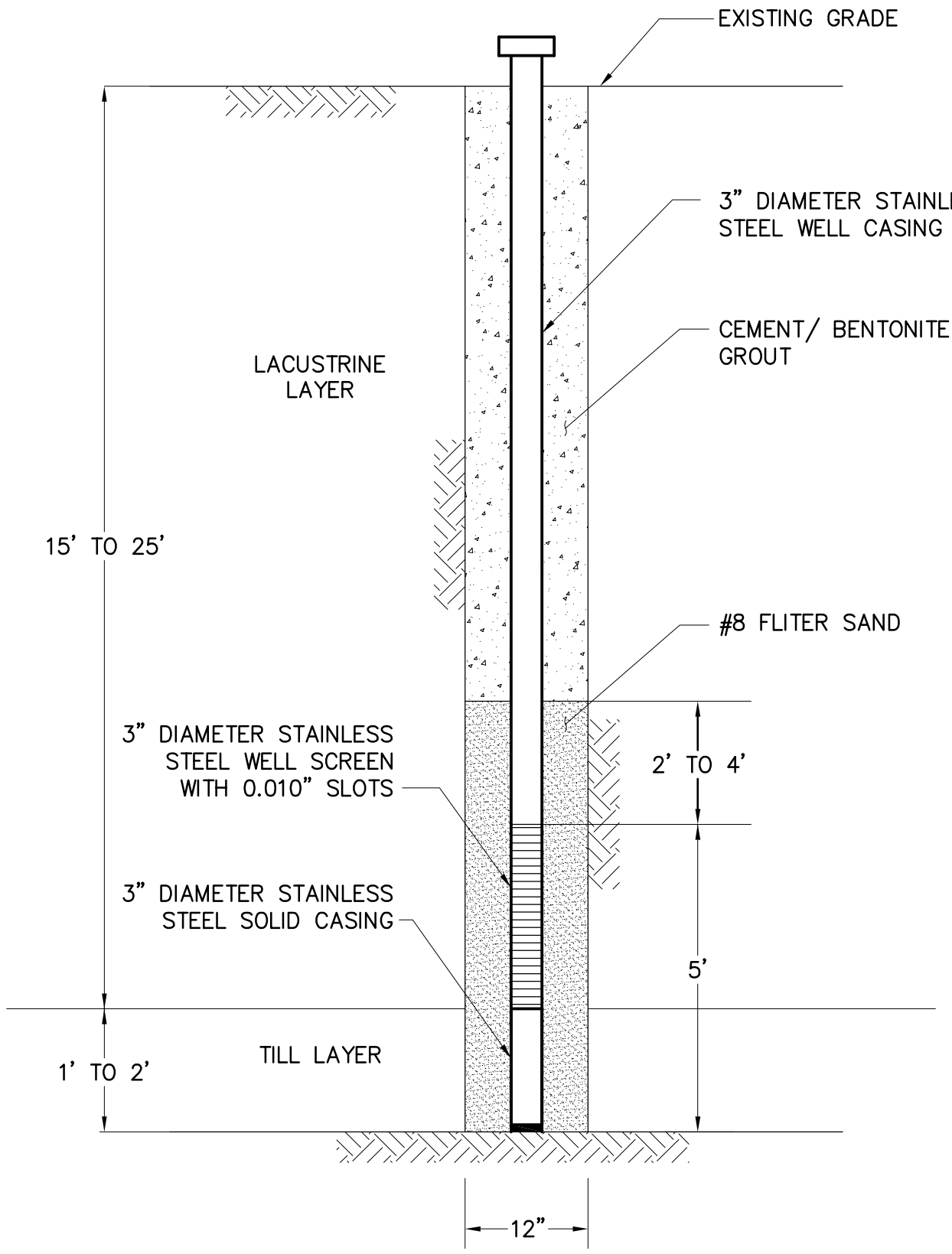


Figure 2-5



NOT TO SCALE

DETREX CORPORATION

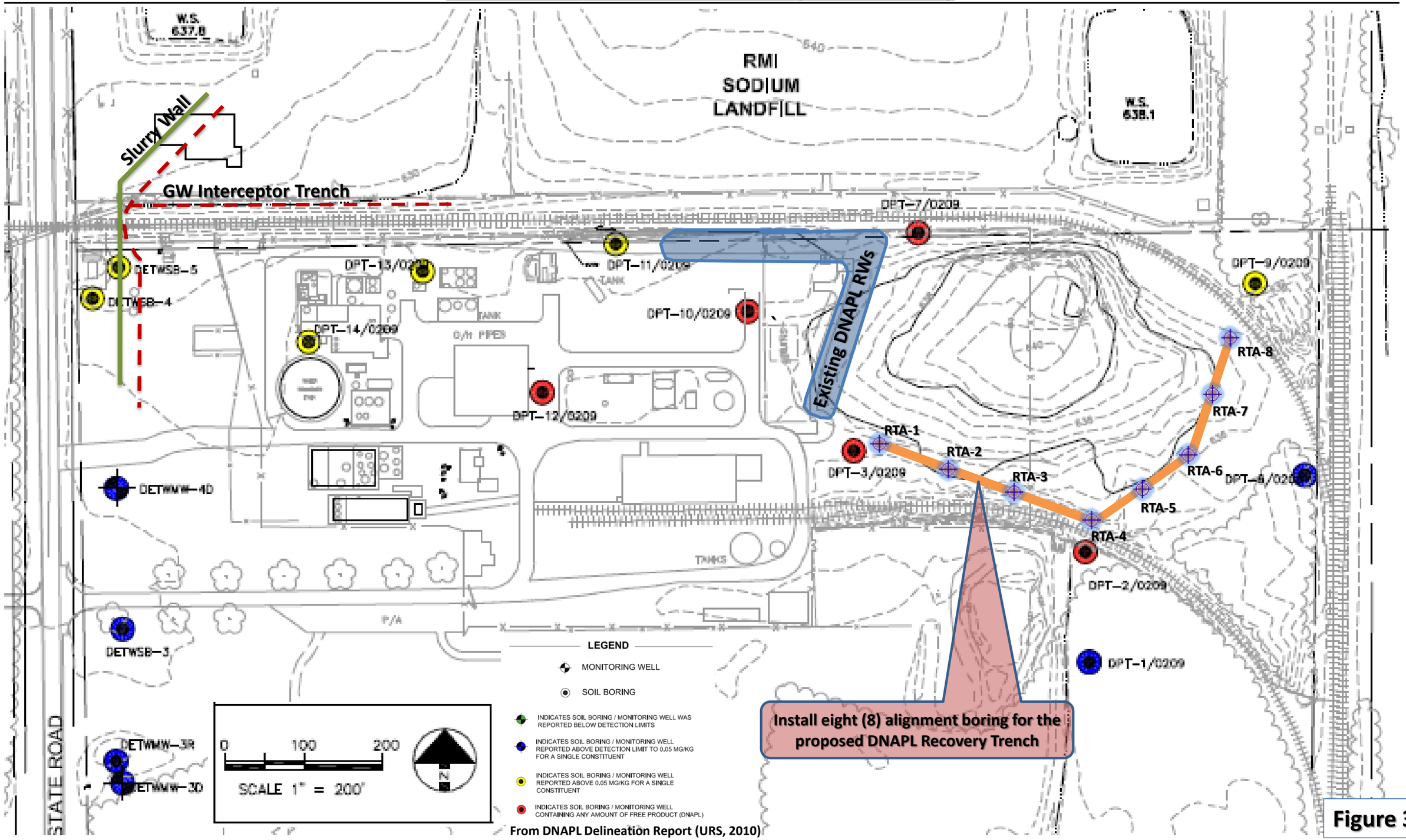
FIGURE 3-1
PROPOSED EXTRACTION WELL CONSTRUCTION DETAIL

URS

K:\Projects\D\Detrex\13814323\DWGs\Figures\DNAPL recovery trench\Figure 3-1.dwg User:nate_marciniak May 20, 2011 - 2:36pm

Conceptual Design – Additional DNAPL Recovery Trench Alignment Borings

Detrex Site – Ashtabula, OH (Aerial View)

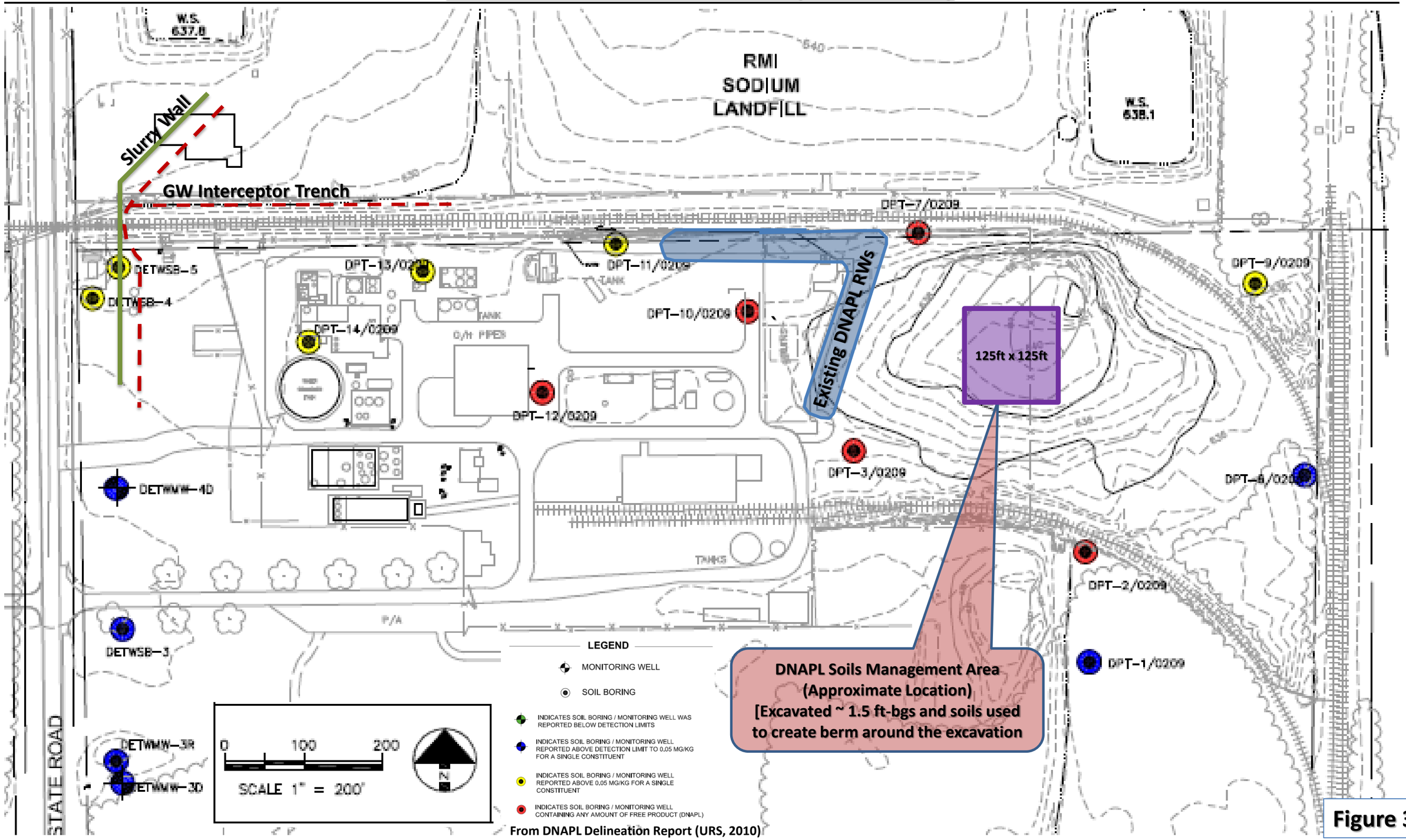


From DNAPL Delineation Report (URS, 2010)

Figure 3-2

Conceptual Design – DNAPL Recovery Soils Management Area Location

Detrex Site – Ashtabula, OH (Aerial View)

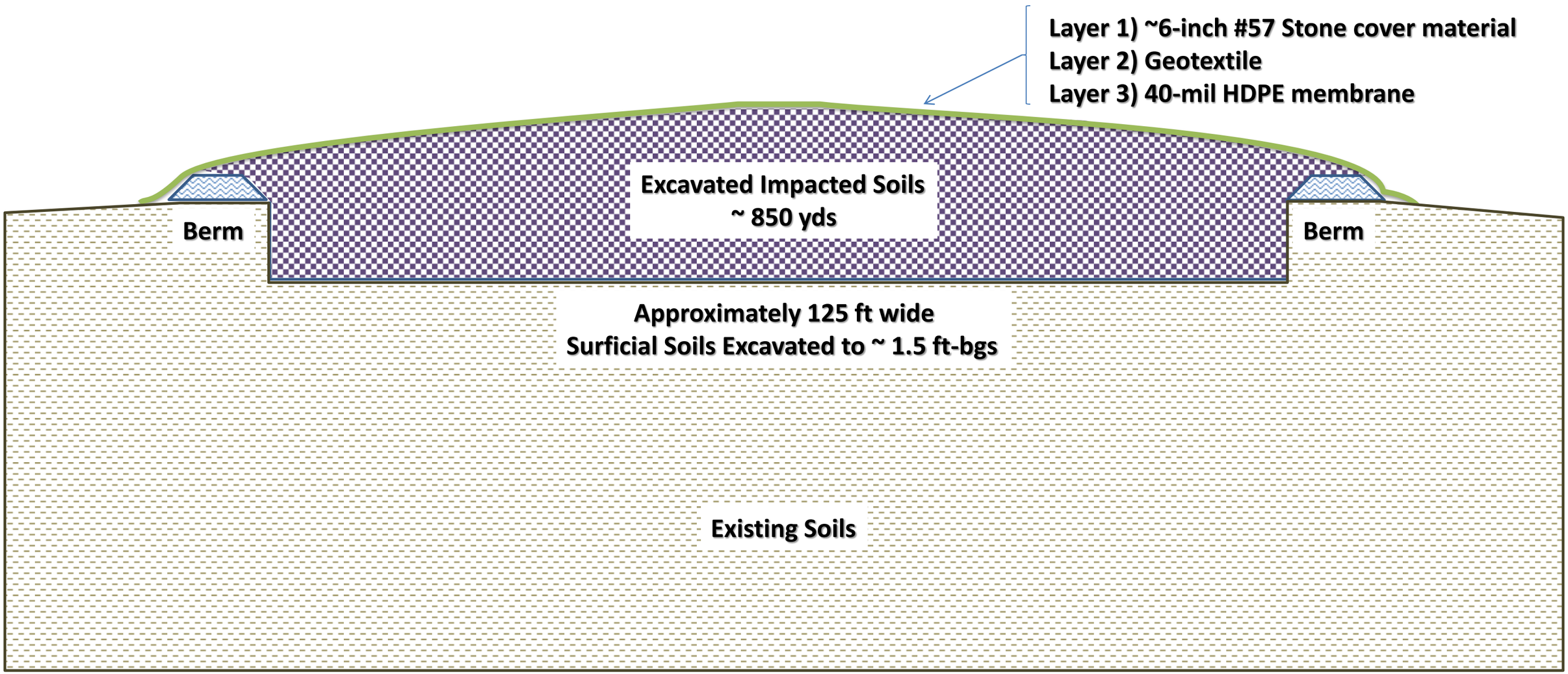


From DNAPL Delineation Report (URS, 2010)

Figure 3-3

Conceptual Design – DNAPL Recovery Soils Management Area X-Section

Detrex Site – Ashtabula, OH



Note: Not to Scale

Figure 3-4

APPENDIX A
AGENCY CORRESPONDENCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF: SR-6J

March 28, 2011

Thomas W. Steib
Operations Manager
Detrex Chemicals Division
Elco Corporation
1100 N. State Road
Ashtabula, OH 44004

Re: Interim Operation and Maintenance Manual
Detrex RD/RA Source Control Area, URS, Inc., June 2008
Proposed Recovery Trench Option for Enhanced Fluid Recovery

Dear Mr. Steib:

The U.S. Environmental Protection Agency (EPA) recognizes the continuing technical challenges Detrex has faced in attempting to optimize its source area DNAPL extraction system. The Operation and Maintenance Manual has two proposals that have not yet been implemented to address the DNAPL source area. First, Section 3.1.5 of the O&M Manual proposed adding an additional transect of pre-packed 3" recovery wells. These new wells were never installed. A work plan that outlines the installation of these wells along the northern border of the facility should be prepared and provided to EPA by May 1, 2011.

The O&M Manual also proposed a DNAPL Recovery Trench as an option to installing more recovery wells. At our February 2011 meeting in Cleveland, you stated that Detrex was interested in moving forward with the trench option and if EPA could provide the necessary regulatory clarification regarding the handling of the excavated material.

We have consulted with staff in our Land and Chemicals Division about this issue and RCRA Land Disposal Restrictions will not be triggered if the following conditions are met:

1. There needs to be an affirmative determination that the materials are remediation waste.
2. The waste material must be kept within the area of contamination.
3. The waste material must be controlled so as to pose no risk of migration.

Provided that you can comply with those conditions, your request to proceed with the recovery trench option is approved. Please provide EPA with a work plan before proceeding with any field work.

I can be reached by phone at 312 886-4843 if you have any questions.

Sincerely,

W. Owen Thompson
Remedial Project Manager
Superfund Division

cc: Peter Felitti, U.S. EPA C-14J
William Earle, SulTRAC
Robert Currie, Detrex
Martin Schmidt, URS